

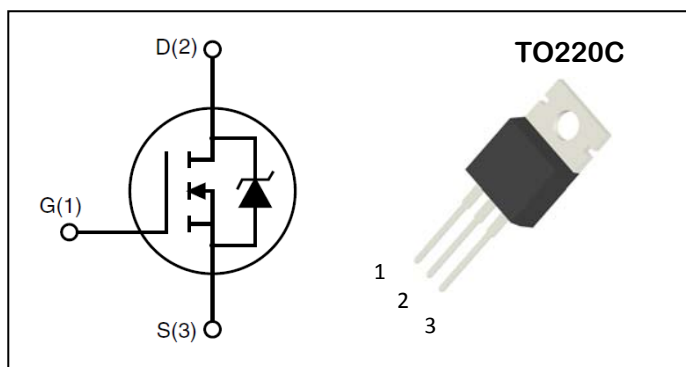
N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY

V_{DSS}	I_D	$R_{DS(ON)}$ (m Ω)
40V	380A	1.5m Ω

Features:

- Low Gate Charge for Fast Switching Application
- Low $R_{DS(ON)}$ to Minimize Conductive Loss
- 100% EAS Guaranteed
- Fast Recovery Body Diode
- Lead-Free,RoHS Compliant



Description:

The ADM380N04 series MOSFETs is a new technology, which combines an innovative super junction technology and advance process. This new technology achieves low $R_{ds(on)}$, energy saving, high reliability and uniformity, superior power density and space saving.

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Ratings	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		40	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		175	°C
T _{STG}	Storage Temperature Range		-55 to 175	°C
I _S	Diode Continuous Forward Current	T _C =25°C	380	A
Mounted on Large Heat Sink				
I _{DM}	300μs Pulse Drain Current Tested ⁽²⁾	T _C =25°C	1514	A
I _D	Continuous Drain Current ⁽¹⁾	Silicon Limited	380	A
		Package Limited	192	A
P _D	Maximum Power Dissipation	T _C =25°C	397	W

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
R_{thJC}	Thermal resistance junction-case max ⁽¹⁾	0.38	$^\circ\text{C/W}$
R_{thJA}	Thermal resistance junction-ambient max ⁽¹⁾	61	$^\circ\text{C/W}$

Electrical Characteristics (TA=25°C Unless Otherwise Noted)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
On/off Characteristics						
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250uA	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V,V _{GS} =0V ,T _J =25°C	--	--	1	uA
		V _{DS} =32V,V _{GS} =0V , T _J =125°C	--	--	100	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	1.0		3.0	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
R _{DS(ON)}	Drain-SourceOn-stateResistance ⁽²⁾	V _{GS} = 10V, I _{DS} =80A	--	1.2	1.5	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} =0V,	--	8.9	--	nF
C _{oss}	Output Capacitance	V _{DS} =25V,	--	1.5	--	
C _{rss}	Reverse Transfer Capacitance	Frequency=1MHz	--	0.4	--	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time	V _{DS} =20V,	--	18	--	ns
t _r	Turn-on Rise Time	I _D = 120A, V _{GS} = 10V,	--	25	--	
t _{d(OFF)}	Turn-off Delay Time	R _{GEN} =2.5 Ω	--	133	--	
t _f	Turn-off Fall Time		--	26	--	
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} = 10V,	--	166	--	nC
Q _{gs}	Gate-Source Charge	I _{DS} =120A	--	27	--	
Q _{gd}	Gate-Drain Charge		--	39	--	
Avalanche Characteristics						
EAS	Single Pulse Avalanche Energy ⁽³⁾	V _{DD} =20V,L=1mH ,V _{GS} =10V ,R _g =25 Ω	648	--	--	mJ
Diode Characteristics						
V _{SD}	Diode Forward Voltage ⁽²⁾	I _{SD} = 80A, V _{GS} = 0	--	--	1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =80A, dI _{SD} /dt=100A/μs	--	60	--	ns
q _{rr}	Reverse Recovery Charge		--	104	--	nC

NOTES:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The Min. value is 100% EAS tested guarantee.

Typical Performance Characteristics

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

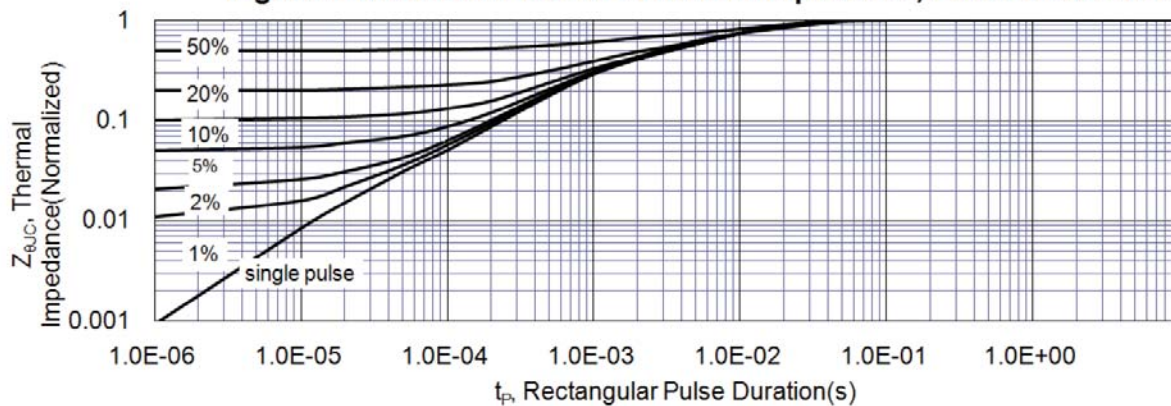


Figure 2. Maximum Power Dissipation vs. Case Temperature

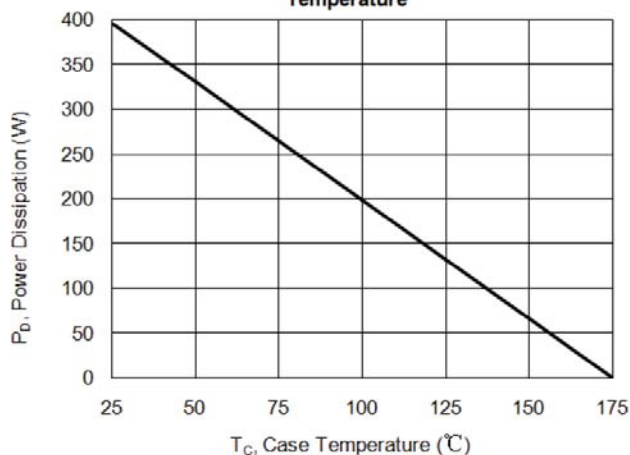


Figure 3. Maximum Continuous Drain Current vs Case Temperature

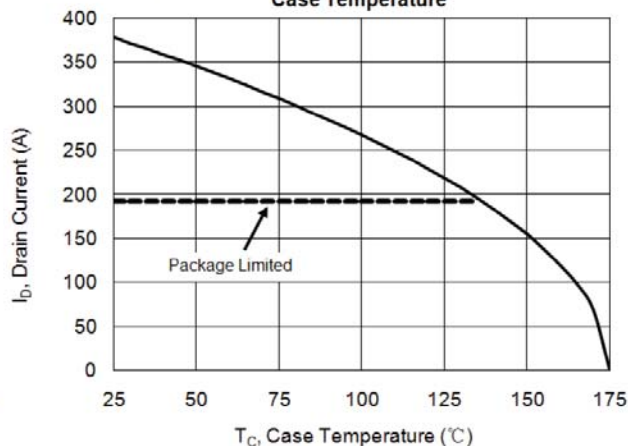


Figure 4. Typical Output Characteristics

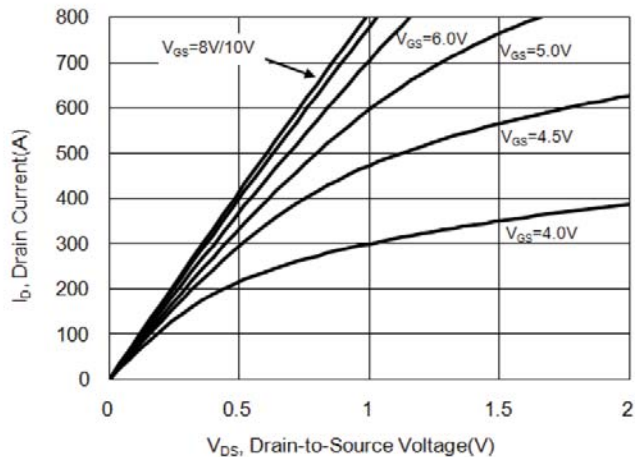


Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage

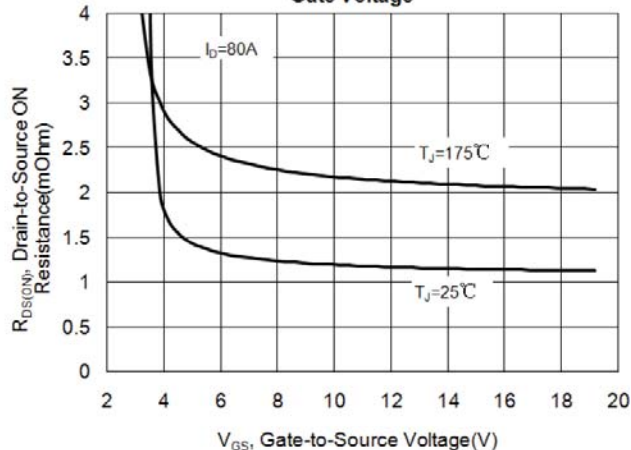


Figure 6. Maximum Peak Current Capability

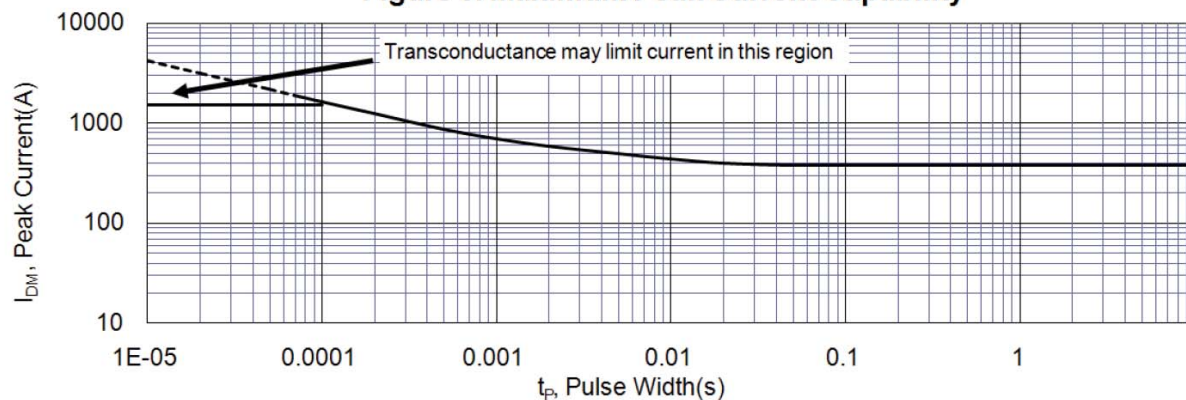


Figure 7. Typical Transfer Characteristics

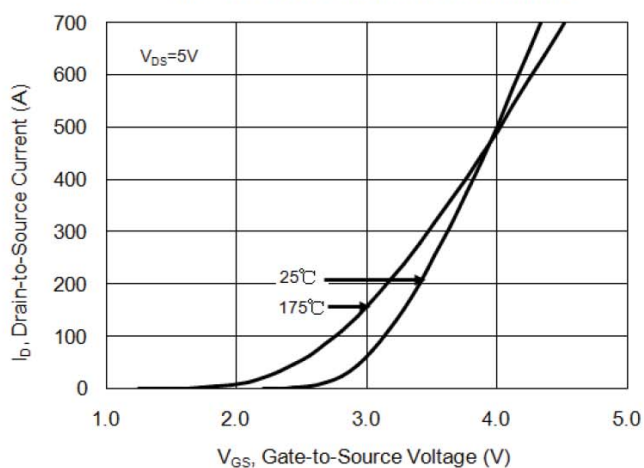


Figure 8. Unclamped Inductive Switching Capability

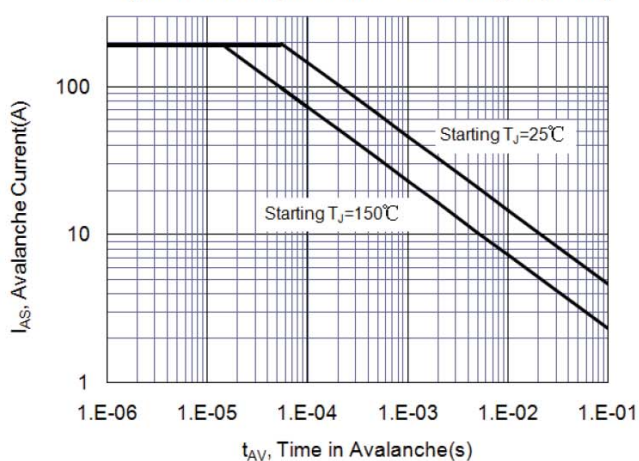


Figure 9. Typical Drain-to-Source ON Resistance

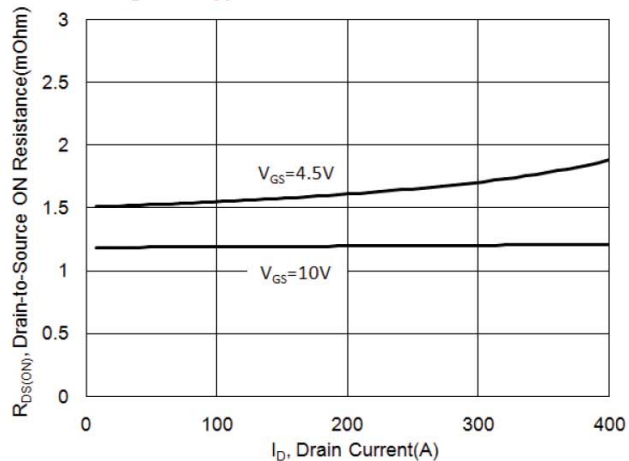


Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature

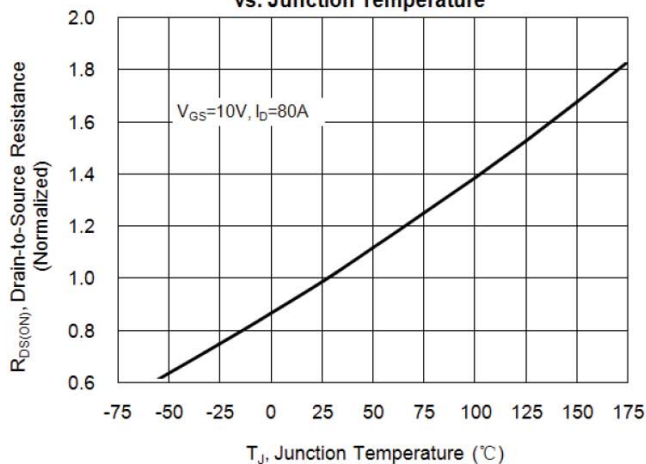


Figure 11. Typical Breakdown Voltage vs. Junction Temperature

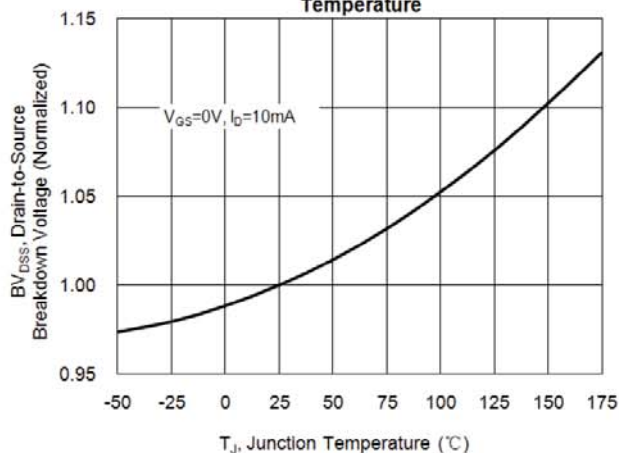


Figure 12. Typical Threshold Voltage vs. Junction Temperature

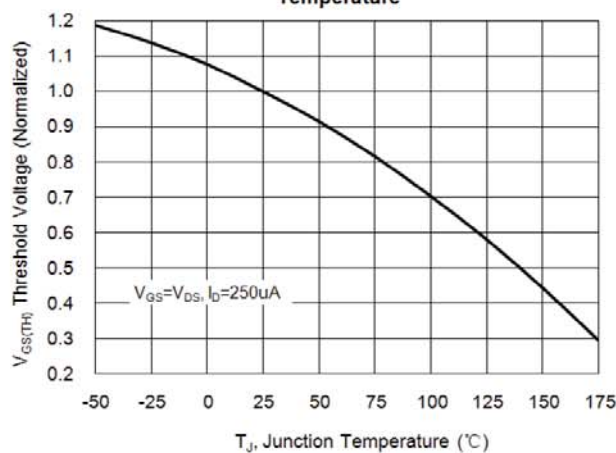


Figure 13. Maximum Forward Safe Operation Area

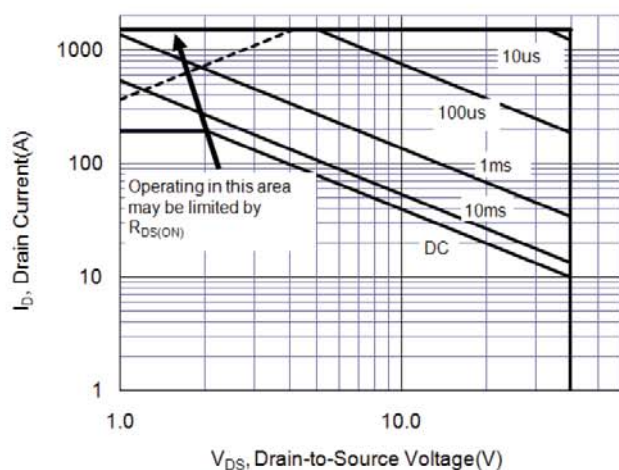


Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

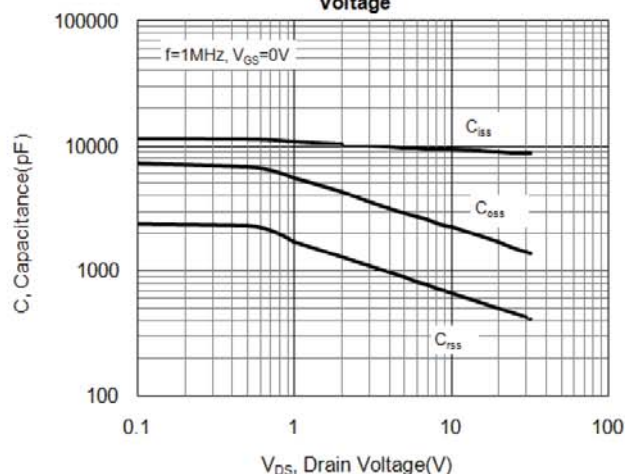


Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

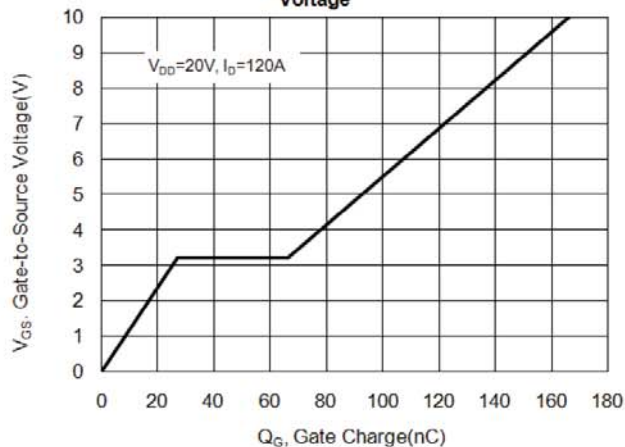
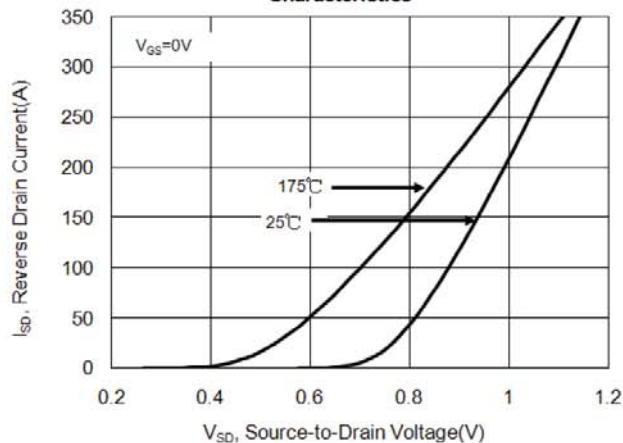
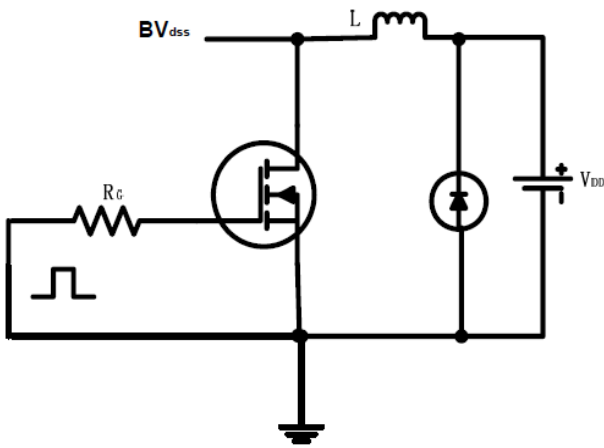


Figure 16. Typical Body Diode Transfer Characteristics

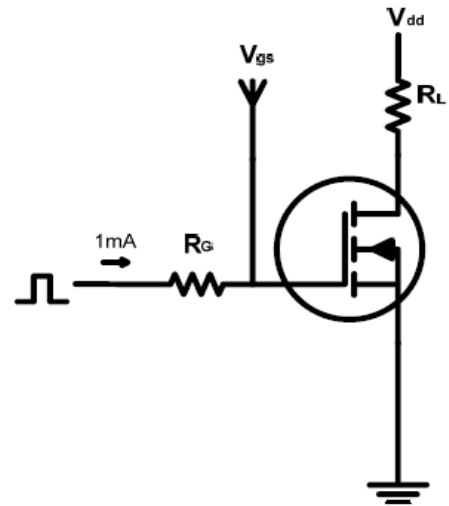


Test circuits and Waveforms

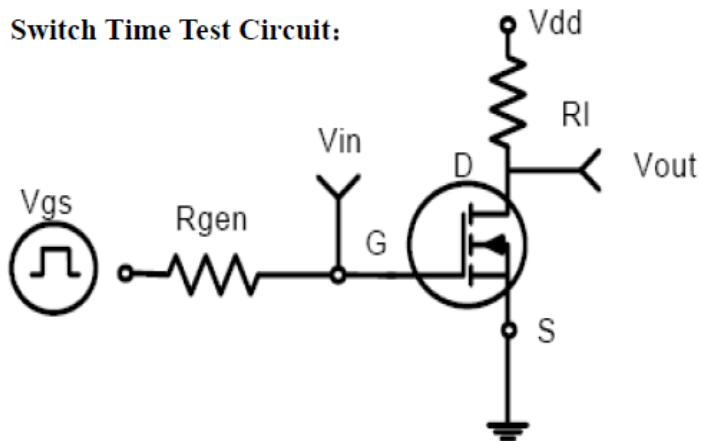
EAS test circuits:



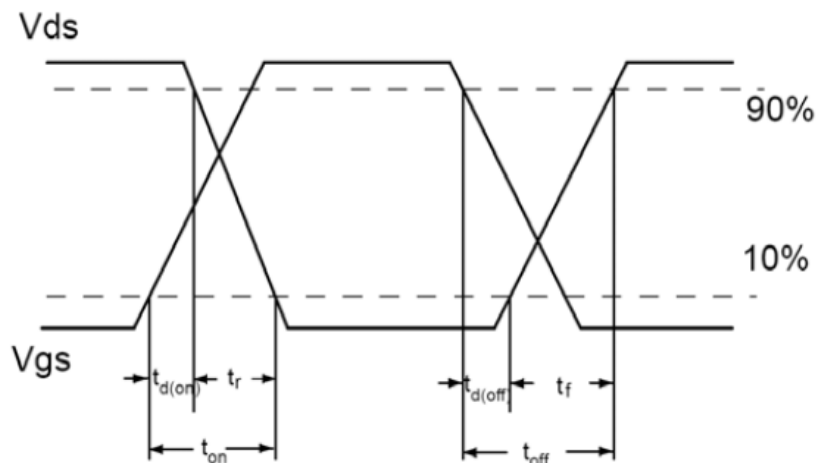
Gate charge test circuit:



Switch Time Test Circuit:

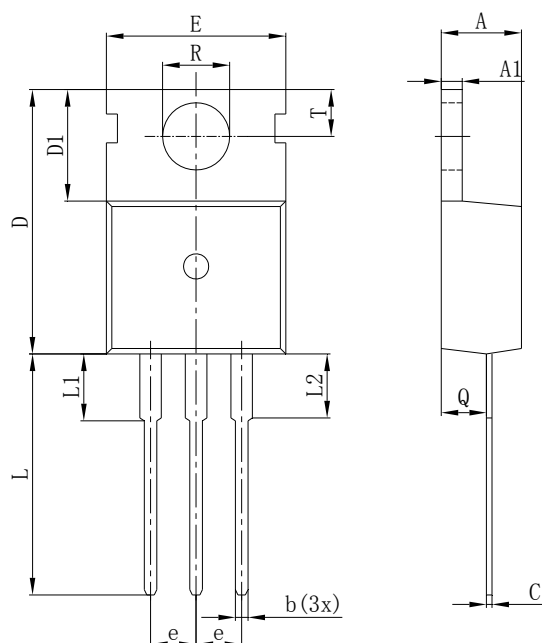


Switch Waveforms:



PACKAGE MECHANICAL DATA

TO-220C Package Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
e	2.54 TYP		0.099TYP	
A	4.10	4.70	0.161	0.185
A1	1.25	1.40	0.049	0.055
b	0.60	0.90	0.023	0.035
C	0.40	0.70	0.016	0.027
D	15.20	16.00	0.598	0.630
D1	5.90	6.60	0.232	0.259
E	9.70	10.30	0.382	0.405
L	12.80	15.00	0.504	0.590
L1	2.79	3.30	0.110	0.130
R	3.50	3.80	0.138	0.149
T	2.70	3.00	0.106	0.118
Q	2.20	2.60	0.086	0.102
L2		3.00		0.118

Ordering information

Part number	Package	Marking	Packing	Quantity
ADM380N04	TO-220C	ADM380N04	Tube	50pcs